Issue 835

K-STATE Research and Extension

Extension Agronomy

eUpdate

01/21/2021

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Sunflower disease management in Kansas

When thinking about pest management in sunflowers, weed control and insect management are often the first thoughts. While these are important pests, it is important to not overlook disease management. Managing diseases can increase yields and standability of the crop at harvest. Here is an overview of common yield-limiting diseases of sunflower in Kansas.

Red Rust

Red rust is one of the most important diseases of sunflower in Kansas. In the Sunflower Survey, which is conducted by the National Sunflower Association, 83% of surveyed sunflower fields in Kansas were infested by red rust by the end of the growing season. In this survey, over 100 fields were scouted from 2005 to 2019, across central and western Kansas. Many of these infections were at low levels, but higher infection levels were found in 10% of fields by the R-8 stage of growth (back of the sunflower head is yellow).

This disease is favored by high relative humidity, long periods of leaf wetness, and temperatures between 55 and 85 F. Early disease onset may contribute to severe yield losses if conditions are favorable. Small, raised, cinnamon-colored pustules will appear on the lower surface of the leaf (Figure 1) and will darken in color as disease develops. Under severe disease pressure, defoliation may occur.

Figure 1. Sunflower red rust disease symptoms. Photo: Doug Jardine, K-State Emeritus Extension Plant Pathologist.

Early scouting is key for successful red rust control. Red rust management decisions happen between growth stages R3 (immature bud is elongated about 1 inch from nearest leaf) and R6 (flowering is complete and ray flowers are wilting). Fungicide application is recommended when the average disease severity reaches 1% on the upper four leaves before the R6 stage of development is reached. More resistance is available in oil hybrids than in confectionary hybrids. Additionally, it is important to control both wild and volunteer sunflowers, avoid high nitrogen rates, and avoid high plant populations.

Click here for more information on "Stages of Sunflower Development".

Rhizopus Head Rot

Rhizopus head rot, another important sunflower disease in Kansas, causes brown, rotted, and stringy lesions on the back of the head (Figure 2). Gray, fuzzy, fungal growth may be found inside the rotted head. Rhizopus was found in 30% of the sunflower fields scouted in the Sunflower Survey since 2005.

Figure 2. Rhizopus head rot disease symptoms. Photo: Doug Jardine, K-State Emeritus Extension Plant Pathologist.

Injuries to the head caused by hail, birds, or insects can increase Rhizopus head rot infection severity.

This disease may cause premature death of the head resulting in head drop, which can lead to 100% yield loss. No fungicides are currently available for control of this disease. Studies have shown that management of sunflower head moth is important in decreasing infection and yield loss because head damage caused by larval feeding is an important entry point for the Rhizopus fungus.

Charcoal Rot

A third important disease to be on the lookout for is charcoal rot. Charcoal rot is major dryland problem across several crops in Kansas including soybeans, corn, and grain sorghum. In sunflower production, this disease is mostly a problem during the hottest, driest years. This disease may cause poor grain fill, premature death, and lodging (Figure 3).

Figure 3. Charcoal rot in sunflower. Photo: Doug Jardine, K-State Emeritus Extension Plant Pathologist.

Charcoal rot management requires the adoption of practices that reduce drought stress such as lower plant populations, efficient weed and insect control, irrigation, and reduced tillage.

Helpful Resources

A "Sunflower Production Guide" (A1995), Kandel et al. 2020, was just updated and published by our colleagues at North Dakota State University. You can download a copy of this resource here: https://bit.ly/2KGCj1e

For Kansas, a resource that covers all aspects of sunflower production is the "High Plains Sunflower Production Handbook". This is publication contains photos of sunflower growth stages, weeds, and diseases. You can download it at https://bit.ly/3c0TgPe . You can also pick up a printed copy at your local K-State Extension Office.

Need Help with a Sunflower Problem?

Contact your local K-State Extension Office. They will work with you to send photos of the problem (close-up, whole plant, field shot) and plant samples to the K-State Plant Disease Diagnostic Lab. Here are guidelines that can help get a good sample to the lab:

Use this link for the sample submission form:

https://www.plantpath.k-state.edu/extension/diagnostic-lab/documents/DiseaseLabChecksheet.pdf

- Fill out the accompanying Plant Diagnostic Lab Form (PDF) as completely as possible.
- Send a plentiful amount of fresh plant material (including roots), it is best to include the entire plant when possible. Shake off most of the soil.
- Send a sample characteristic of the problem that exhibits a range of symptoms.
- Dig (do not pull) up the plant, so the roots remain intact.
- Do not add water or wet paper towels to the sample!
- Seal the plant material in an appropriately sized plastic bag and pack in a crush-proof container.
- Put the accompanying information sheet in a separate plastic bag to keep it dry.
- Bring your sample to the local K-State Extension Office for shipping or you can ship it overnight or early in the week.

Shipping address:

K-State Plant Disease Diagnostic Lab
4032 Throckmorton PSC
1712 Claflin Road
Manhattan, KS 66506

Contact information for K-State Plant Disease Diagnostic Lab:
clinic@ksu.edu
785-532-1383

Rodrigo Onofre, Plant Pathologist
onofre@ksu.edu

Jeanne Falk Jones, Multi-County Agronomy Specialist
jfalkjones@ksu.edu

Doug Jardine, Emeritus Extension Plant Pathologist

2. 2021 wheat variety fall forage yield comparison

Fall forage yield is an important aspect of dual-purpose wheat production. In this system, wheat is typically sown earlier than for grain only production, at higher seeding rates and with additional nitrogen fertilizer to maximize forage production.

The weather experienced during the fall is crucial to determine average level of forage yield, with warm and moist weather typically resulting in greater forage yield than cool and dry weather conditions. Management practices that also maximize forage yield are early sowing, higher seeding rates, placement of in-furrow phosphorus fertilizer with the seed at sowing, and fall nitrogen fertilization.

While the weather is typically the largest player in determining fall forage production, followed by management, there are also differences among wheat varieties in forage production potential. Thus, every year, the K-State Wheat Production Group compares the forage yield of several commonly grown wheat varieties and upcoming lines. This test is usually performed in the South Central Experimental Field near Hutchinson, Kansas (Figure 1), and the forage sampling occurs sometime in December (Table 1).

Figure 1. Dual-purpose wheat trial near Hutchinson, KS. The trial was sown on September 17, 2020, with 50 lbs DAP/acre applied in furrow, and 90 lbs N/acre broadcast incorporated prior to sowing. Photo by Romulo Lollato, K-State Research and Extension.

At the sampling conducted on December 22, 2020, there were no significant differences in fall forage yield among the 34 wheat varieties tested. Average forage yield was low, ranging from 470 to 1,058 pounds of dry matter per acre and averaging 737 pounds of dry matter per acre. While the numerical

differences between some varieties seem large, we highlight that these differences were not significant. This low forage production was a function of the combination of an extremely dry fall, which had enough moisture for a good germination and crop establishment (Figure 1) however with limited subsequent moisture (total of ~3 inches between sowing and forage measurement) and low temperatures (average 49°F). The dry and cool conditions experienced during the fall did not allow for much forage biomass production, which was reflected in the measurements shown in Table 1.

Another important aspect of dual-purpose wheat production is how long each variety can be grazed in the spring. This is measured as the date for *first hollow stem*, and varieties can differ in as much as 20-30 days in achieving first hollow stem in the spring. The Wheat Production Group at K-State uses this very same trial to measured first hollow stem during late February and early March, so stay tuned to the eUpdate for updates on first hollow stem progression among our wheat trials.

Table 1. Fall forage yield of wheat varieties sown under a dual-purpose system near Hutchinson, KS. Forage biomass was collected on December 22, 2020. Data is shown in pounds of dry matter per acre (lbs DM/ac). There were no statistically significant differences among the varieties evaluated. Varieties are ordered alphabetically.

Variety	Forage dry matter (12/22/2020)
	------- lbs DM/ac -------
10BC329-17-5	714
AP EverRock	733
AP Roadrunner	858
Buckhorn AX	1058
Canvas	782
Crescent AX	704
High Country	789
KS12DH0156-88	851
KS13DH0041-35	773
KS Dallas	601
KS Hamilton	758
KS Hatchett	829
KS Silverado	664
KS Western Star	720
LCS Atomic AX	532
LCS Helix AX	679
LCS Julep	952
LCS Photon AX	735
LCS Revere	833
Long Branch	723
MS Maverick	729
NUSAKA15-3	808
OCW04S717T-6W	751
OK12912C-138407-2	739
OK16D101089	952
OK Corral	839
Paradise	470

Rock Star	745
Showdown	548
Smiths Gold	711
WB4269	654
WB4401	554
WB4699	642
Zenda	620
Average	737
Minimum	470
Maximum	1058

Romulo Lollato, Extension Wheat and Forages Specialist
lollato@ksu.edu

Roberta Rebesquini, Visiting Undergraduate Scholar
rbr@ksu.edu

3. Emergency measures to control wind erosion

Cropland can be quite susceptible to wind erosion under some conditions, particularly through the winter. Cooler-than-normal temperatures and drought conditions may limit vegetative growth and cover. Burning, tillage, and little crop residue can create a particularly serious hazard. Care should be taken to maintain crop residue through reducing tillage and careful to not remove too much residue through grazing or haying, such as leaving strips unhayed (Figure 1a) or capturing forage sorghum regrowth to occur (Figure 1b).

Figure 1a. Strips of unharvested corn stalks to prevent snow and soil blowing. Photo by John Holman, K-State Research and Extension.

Figure 1b. Forage sorghum regrowth after harvest. Photo by John Holman, K-State Research and Extension.

Winter wheat and other fall-planted crop fields also may be susceptible during periods of low cover in the winter and early spring. This can result in fields blowing out (Figure 2). This is particularly true during drought. Marginally productive cropland may not produce sufficient residue to protect against wind erosion. In addition, overgrazed or poorly vegetated rangeland may also subject to wind erosion. Recent wind conditions have been conducive to erosion (Figure 3a), reduced visibility making for dangerous driving conditions (Figure 3b), given the peak wind gusts that have been recorded in Kansas over the last few days (Figure 4).

Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

Figure 2. Winter wheat stand blown out by wind erosion. Photos by John Holman, K-State Research and Extension.

Figure 3a. Blowing soil in Colby on October 11, 2020. Photo taken by Lucas Haag, K-State Research and Extension.

Figure 3b. Blowing soil reducing visibility. Photo by John Holman, K-State Research and Extension.

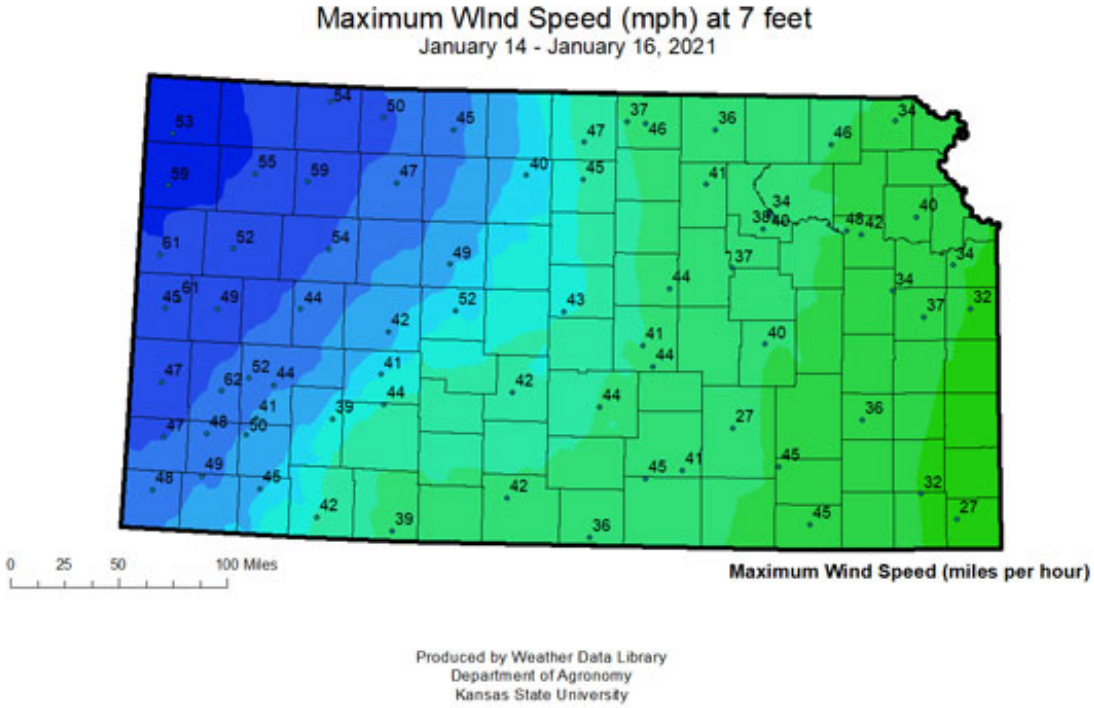

Figure 4. Peak 24-hour wind gusts measured at 2 meters (7 feet) between January 14 and January 16, 2021. Map by Kansas Weather Data Library.

It is important to monitor field conditions and identify fields that are in a condition to blow. Such conditions include low vegetation cover and a high proportion of erodible-sized clods (less than 1 mm in size, or about the thickness of a dime). It is better to be proactive and treat potential problems before they occur than to try to react and catch up once a field is actively eroding. Once soil movement has started, it is difficult to completely stop further damage. However, prompt action may prevent a small erodible spot from damaging an entire field or adjacent fields.

Emergency control measures

Mulching. If wind erosion has already started, it can be reduced by mulching with manure or other anchored plant materials such as straw or hay. To be effective, at least 1.5 to 2 tons per acre of straw or grass or 3 to 4 tons per acre of corn or sorghum stover are needed to control areas of erosion, and the straw or hay must be anchored. Residue can be spread by hand, spreader or other mechanical equipment.

A stubble puncher or disk set straight may be used to anchor residue and prevent it from being blown away. Wet manure application should be 15 to 20 tons/acre and not incorporated into the soil. Care should be taken to not add wheel paths parallel to the wind direction as the mulch is applied. Traffic areas and wheel paths can contribute to wind erosion.

Generally, mulches are practical only for small areas, so mulching is most effective when applied before the soil starts to move. Producers should scout fields to identify areas that might be susceptible to wind erosion (low vegetation cover and a high proportion of erodible-sized clods less than the thickness of a dime) if they plan to use mulch or manure to controls.

Emergency tillage. Emergency tillage is a last-resort method that can be effective if done promptly and with the right equipment. The goal of emergency tillage is to make the soil surface rougher by producing resistant clods and surface ridges (Figures 5 and 6). A rough surface reduces wind speed. The larger clods and ridges resist movement and provide traps to catch the moving soil particles.

Chisels with single or only a few tool ranks are frequently used to roughen the soil surface. The combination of chisel point size, speed, and depth that produces the roughest surface with the firmest, most resistant clods should be used for emergency tillage.

Research has shown that a narrow chisel (2 inches wide) on 24- to 54-inch spacing, operated 3 to 6 inches deep will usually bring enough resistant clods to the surface to control erosion on fine-textured (clay-based) soils. A medium shovel (4 inches wide) can be effective for medium-textured soils (loamy soils). Spacings should typically be narrower where there is no cover and wider in areas of partial cover, such as a growing crop or plant residue.

If the erosion conditions recur or persist, a second, deeper chiseling should split the first spacing. Tillage passes should be made perpendicular to the direction of the prevailing wind causing the erosion. First tillage passes should be made on the upwind side of blowing soil to stop the advancing front, and slow the time the furrows are filled in with blowing soil (if tillage is done on the downwind side the furrows will fill rapidly).

Figure 5a. Emergency tillage across 50 percent of the field. Photo courtesy of USDA-ARS Engineering and Wind Erosion Unit, Manhattan, Kansas.

Figure 5b. Emergency tillage perpendicular to wind direction and angled to last tillage operation. (photo by John Holman).

Figure 5c. Tillage to roughen soil surface (photo by John Holman).

Figure 6. Widely spaced shanks used for emergency tillage, making clods to roughen the soil surface. Photo courtesy of University of Nebraska.

If emergency tillage is to be used in growing crops that are covered by crop insurance, producers should check with their crop insurance providers regarding emergency tillage insurance rules. Emergency tillage does not significantly reduce wheat yields of an established crop. Studies in southwest Kansas and Manhattan demonstrate that the use of a chisel on 40-inch spacing reduced wheat yields by 5.5 bushels per acre on the emergency tillage area, due to direct injury caused by the tillage action. Since the entire field is rarely tilled when performing emergency tillage, the overall yield reduction for the field will be less than 5.5 bushels per acre. In fact, yields in the untilled portion of the field actually can be increased by the use of emergency tillage since that tillage will reduce the amount of damage to wheat caused by wind erosion. The overall reduction in yield for fields that have received emergency tillage has been as little as 1 bushel per acre in the studies mentioned above.

Performing emergency, clod-forming tillage across the field is effective in reducing wind erosion. The degree of success of emergency tillage is highly dependent on climatic, soil, and cover condition. It is often not necessary to till the entire field, but rather, it is very effective to perform emergency tillage passes across 50% of the field (till a pass, leave a pass, repeat). Narrow chisel spacing (20 to 24 inches) is best for this method. Emergency tillage is most effective if there is some subsoil moisture and clod formation.

If 50% of the area has been tilled and wind erosion persists, the omitted strips can be emergency-tilled in a second operation to make result in full-cover tillage. If a second tillage pass is needed, it should be at a greater depth than the first pass. Under some conditions 50% of the field may not need to be tilled, but 20-30% tilled might be effective if there is some residue cover and lower

potential for erosion. Wide-chisel spacings are used in the full-field coverage method. The space between chisel grooves can be chiseled later should wind erosion persist.

All tillage operations should be perpendicular or across the direction of the prevailing or eroding wind. For most of Kansas, this means that an east-west direction of tillage is likely best.

The best wind erosion control is created with maximum surface roughness when resistant clods cover a major portion of the surface. Research shows that lower travel speeds of 2 to 3 mph generally produce the largest and most resistant clods. However, speeds of 5 to 7 mph produce the greatest roughness. Because clod resistance is usually reduced at higher speeds, the effect may not be as long-lasting as at lower speeds. Thus, higher speeds are recommended where erosion is already in progress, while lower speeds might be a better choice in anticipation of erosion.

Depth of tillage usually affects clod stability more than travel speed, but optimum depth is highly dependent on soil conditions (such as moisture level) and compaction. Deeper tillage passes can produce more resistant clods than shallow passes.

If the problem is severe and the wheat has already been destroyed or the ground is bare, chisels 4 to 6 inches wide on a 24- to 30-inch spacing will generally provide enough clods to control erosion. Operating depth should be 4 to 6 inches.

Controlling wind erosion on sandy soils

Loose sandy soils require a different tillage approach to effectively control erosion. Clods cannot be formed at the surface that will be sufficiently resistant to erosion on sandy soils. Erosion resistance is achieved through building ridges and furrows in the field to provide adequate protection.

A 14-inch moldboard lister spaced 40 to 50 inches apart (or an 8-inch lister on 20- to 24-inch spacing) is needed to create sufficient surface roughness. The first listing pass should be shallow, not more than about 4 to 5 inches deep. Then, when additional treatment is needed, the depth should become progressively deeper. Alternatively, for the second treatment, the original ridge may be split.

The addition of manure to the ridged surface may also be beneficial in these situations.

Tips for effective emergency tillage

- Watch the weather forecast for periods of high winds, particularly when soils are dry.
- Assess residue and plant cover prior to the wind blowing, and take preventive action with emergency tillage. It is much easier to prevent the problem from starting than to stop erosion after it begins. If you wait, the soil only gets drier and some moisture is needed to form clods.
- Use the combination of tractor speed, tillage depth, and chisel point size that will produce the roughest surface with the most resistant clods. If wind erosion is anticipated, do some test tillage prior to an erosion event to see what tillage tool, depth, and speed will provide adequate clods and surface roughness.
- Always start at the upwind location when the field is blowing. A sufficient area upwind of the eroding spot should be tilled, in addition to the area presently blowing.
- Till in a direction perpendicular to the prevailing wind direction. For row crop areas it may be necessary to compromise direction and follow the row pattern. Maintain as much anchored stubble in the field as possible.

For more information, see K-State Research and Extension publication MF2206, *Emergency Wind Erosion Control*, at: http://www.ksre.ksu.edu/bookstore/pubs/MF2206.pdf

DeAnn Presley, Soil Management Specialist
deann@ksu.edu

John Holman, Cropping Systems Agronomist
jholman@ksu.edu

Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

Marestail (*Erigeron canadensis*), known as horseweed to weed scientists, is a troublesome weed in several cropping systems in Kansas and beyond. It is classified in the Aster family, which is a very large group of plants that also includes several marestail "look-alikes". Table 1 briefly compares marestail with one of those look-alikes, dwarf fleabane.

Table 1. Key features that distinguish marestail from dwarf fleabane

	Marestail	**Dwarf fleabane**
Distribution	Throughout Great Plains	Eastern and Central Great Plains
Height	Generally 1.5 to 3 feet; up to 6 feet or more	1 foot
Stem	Bristly hairs, unbranched from base through flowers	Hairs pressed upward, branches near base

Ecology and identification of marestail

Marestail is native to North America and grows throughout the Great Plains. It can be found in fields, rangeland, lawns, and other disturbed sites. There is considerable variation in identifying features among marestail populations, which can make identification troublesome.

Marestail is an annual plant that typically emerges in late fall or early spring and flowers throughout the summer. Marestail begins as a rosette, and the stem elongates to about 1.5 to 3 feet prior to flowering, although some plants may reach heights of greater than 6 feet (Figure 1). Stems are covered with coarse hairs. Leaves are oblong in shape with margins that range from entire in the rosette to toothed as the stem elongates. Leaf surfaces range from smooth to covered with course hairs and are lighter in color on the lower surface. Leaves are generally crowded together on the stem in an alternate arrangement, but they are less crowded near the top of the stem. Leaves may be attached by a short petiole or may be attached to the stem without a petiole.

Figure 1. Left to right: Marestail rosette, plant during stem elongation, marestail leaf showing toothed margins and bristly hairs, and marestail inflorescence. Photos by Sarah Lancaster and Dallas Peterson, K-State Research and Extension.

Marestail flowers are found in a branched inflorescence at the top of the plant that is said to resemble a mare's tail (Figure 1). They have white to pinkish ray florets that surround yellow disk florets. Each inflorescence is about ¼ to 1/3 inch in diameter and surround by leaf-like bracts. Each seed is enclosed in an achene, appearing somewhat like a small dandelion seed with white bristles at one end.

Marestail possesses a strong, pungent smell and may cause skin irritation in humans and livestock. Marestail is known to be allelopathic, inhibiting the germination and growth of some plant species.

Management

Marestail is most problematic in reduced or no-tillage fields. Marestail populations in Kansas have developed confirmed resistance to glyphosate and ALS-inhibiting herbicides. In addition, application timing is key. Marestail plants that are approximately 4 inches tall are better controlled by herbicides than either rosettes or 8-inch plants. Some herbicides that effectively control marestail are listed in Table 2. Be sure to consult herbicide labels for use rates appropriate for your crop and application timing.

Table 2.Effective herbicides for the control of marestail.

Herbicide (Group)	**Timing relative to weed emergence**
Sonic (2+14)	PRE
Fierce XLT (2, 14, 15)	PRE
Authority Supreme (14, 15)	PRE
Fierce MTZ, Kyber (5, 14, 15)	PRE
Lexar (5, 15, 27)	PRE
Trivence (2, 5, 14)	PRE, POST
Canopy EX (2)	PRE, POST
Envive (2+14)	PRE, POST
Sharpen (14)	PRE, POST
Acuron (5, 15, 27)	PRE, POST
Expert (5, 9, 15)	PRE, POST
2,4-D (4)	POST
Scorch (4)	POST
XtendiMax, Clarity (4)	POST

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements.

For more information on controlling marestail, please consult the 2021 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland, K-State publication SRP-1162.

References: McCauley et al., 2019

Sarah Lancaster, Extension Weed Science Specialist
slancaster@ksu.edu

5. 2021 Kansas Corn School webinar series - Feb. 4 and 11

Kansas Corn is partnering with K-State Research and Extension to offer winter learning sessions for Kansas corn farmers. Due to COVID-19 concerns, the Kansas Corn Management Schools will be held virtually in a series of webinars. There are still two sessions to come in February. Each webinar will start at 7 p.m. and include two presentations with a question-and-answer session. Participants will have the opportunity to hear the latest research and production information and hear updates on markets and corn policy issues. These sessions are free for farmers to attend.

Webinar dates and presentations:

- **Thursday, Feb. 4, 2021**
  - Weed Control, Dr. Sara Lancaster, K-State
  - Planter Technology—Lessons Learned for Corn, Dr. Ajay Sharda, K-State
- **Thursday, Feb. 11, 2021**
  - Markets and Futures Prices, Dr. Dan O'Brien, K-State
  - KCGA Policy Achievements and Ambitions – Josh Roe, Kansas Corn

"Despite today's current challenges with COVID, participating online provides an opportunity for corn farmers to learn the latest research findings on key topics and what challenges to watch out for in agronomy, markets, and policy," said Kansas Corn V.P. of Market Development and Policy Josh Roe.

"The schools will cover a number of issues facing corn producers including nutrient management, management practices, weed control, planter technology, markets, and policy. These events have a long-standing tradition and reputation in offering a solid set of topics of great relevancy to our corn growers in Kansas," said Ignacio Ciampitti, associate professor in the K-State Department of Agronomy.

The webinars are offered at free for growers thanks to support from premier sponsor Pioneer Seeds, and supporting sponsor Compass Minerals. Participants are asked to pre-register online to receive the information and links to the webinar.

Get more information and register online at kscorn.com/cornschool or by phone by calling Kansas Corn at 785-410-5009.

6. North Central Experiment Field Winter Update - January 27

Save the date to attend the virtual North Central Experiment Field Winter Update on January 27 from 11:00 am to 1:00 pm via Zoom. Meet the new Agronomist-in-Charge, Scott Dooley, as he discusses current research at the North Central Experiment field. The update will also feature presentations by Extension Weed Science Specialist, Sarah Lancaster, and Wheat Specialist, Romulo Lollato. There will be time after each presentation for questions from the online attendees.

The event is free to attend. Please register online at www.rivervalley.k-state.edu/upcoming_meetings.html. After registering, a Zoom link will be sent to the email address provided. Contact Scott Dooley at 785-706-8450 or sjdooely@ksu.edu with any questions.

North Central Experiment Field Winter Update

January 27, 2021
11:00 AM – 1:00 PM
via Zoom

Join us for an update on activities at the North Central Field. Meet Scott Dooley, the new Agronomist-in-Charge, as well as listen to presentations by Sarah Lancaster, Extension Weed Management, and Romulo Lollato, Wheat Extension Specialist.

Please register at: www.rivervalley.k-state.edu/upcoming_meetings.html

After registration a Zoom link will be sent to the email address provided. Contact Scott Dooley at 785-706-8450 or sjdooley@ksu.edu with any questions.

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